

# ***FUELS AND LUBRICANTS CHEMISTRY LABORATORY***



The Fuels and Lubricants Chemistry Laboratory (FLL) primarily support the Fuels and Lubricants Division (AIR 4.4.5) programs and NAWCAD engine testing programs through the determination of physical and chemical properties of fuels and lubricants. This facility runs military specification tests for all of the Navy's aviation fuels and lubricants. In addition, the FLL has advanced chemical analysis instrumentation for solving challenging Fleet service problems. At times, this involves developing new analytical methods. This facility is the sole naval aviation lubricant qualification site. It also supports other Center departments by solving their chemical problems.

# Sole Naval Aviation Lubricant Qualification Site

The FLL contains a wide variety of analytical instruments, test equipment, support equipment, supplies and chemicals. When the Propulsion System Evaluation Facility Fuels and Lubricants Chemistry Laboratory moves to Patuxent River in 1998, it will consist of two major rooms for chemistry testing. Major instrumentation for the advanced chemical analysis of fuels and lubricants will be utilized in the Chemical Analysis Lab (Room #039). Instruments for standardized testing to determine physical and chemical properties of fuels and lubricants will be employed in the Property Testing lab (room #047).

## Testing Capabilities:

Standardized physical and chemical property testing primarily involves the performance of tests found in MIL-specs, usually ASTM methods or Federal Test Methods, of all Naval aviation fuels and lubricants. Examples include but are not limited to, viscosity, flash point, density, specific gravity, heating value, sediment, color, acid number, freeze point, and distillation profile testing.

Advanced chemical analysis assists in solving challenging fuel and lubricant Fleet service problems and providing support of the Fuels and Lubricants test programs. Some examples of tests covered in this area are as follows: determining chemical contaminants in fuels and lubricants, identifying and quantifying additives in fuels and lubricants, lubricant basestock and fuel type identifications, and developing new analytical methods tailored to Fuels and Lubricants programs and Fleet problems.

## Standardized Physical and Chemical Property Testing:

- Automatic/manual viscometers



- Autotitrator (TAN, and others)
- Auto flash point apparatus (Pensky-Martens and Cleveland)
- Bomb calorimeter (heating value)
- Digital density meter
- Foam test apparatus
- Hydrogen content apparatus
- Surface tensiometer
- Nitrogen analyzer
- Tensile tester
- Vapor pressure apparatus
- Water analyzer (Karl Fischer)
- Fuel distillation apparatus
- Automatic/manual pour point apparatus
- Peroxide number apparatus
- Sonic shear apparatus
- Numerous other test apparatus

## Advanced Chemical Analysis:

- Four (4) gas chromatographs (GC)
- Three (3) high performance liquid chromatographs (HPLC)
- Gas chromatograph/mass spectrometer (GC/MS)
- Fourier transform infrared spectrometer (FTIR)
- Inductively coupled plasma (ICP) emission spectrometer

- Atomic absorption/graphic furnace spectrometer (AA/GF)
- UV/Vis absorption spectrometer
- X-ray fluorescence spectrometer (XRF)
- Differential scanning calorimeter (DSC)
- GC/FTIR

## Unique Features/Accomplishments:

Unique features of the Fuels and Lubricants Chemistry laboratory testing programs center around the specialized test methods that the lab has developed for fuels and lubricants. Some of the aforementioned test methods, particularly in the area of additive analyses, are performed only in this laboratory and are unavailable elsewhere. It is also worth noting that the expertise residing in this testing arena is especially strong for solving naval aviation fuels and lubricants chemical analysis problems.

*For more information about the Fuels and Lubricants Chemistry Laboratory, contact xxxxx xxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxx.*